

# *Trends in Fusarium and Ergot Presence in Feed Grains and Potential Implications*

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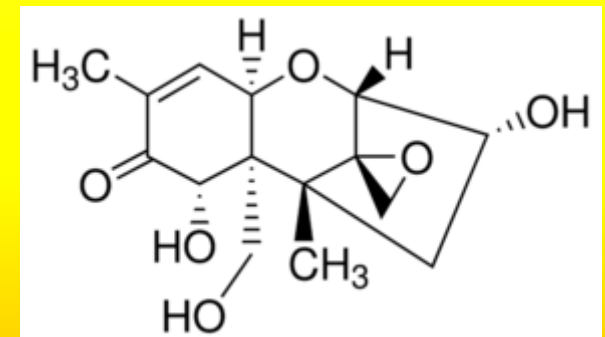
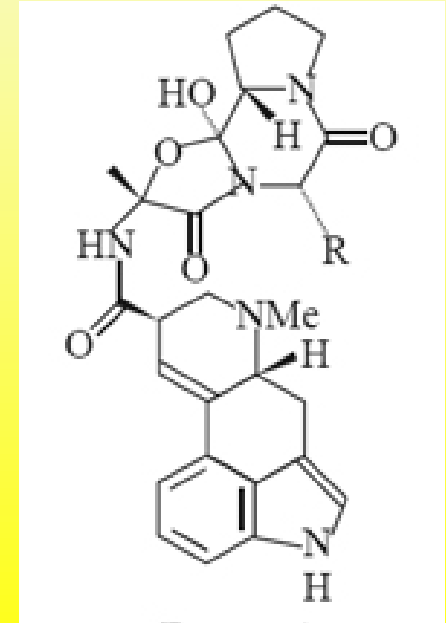
University of Saskatchewan

# Background

- Not problematic historically in Saskatchewan
- Recent years: increased occurrence of ergot and *Fusarium* mycotoxin contamination
- Major economic concern

# Major Types of Mycotoxins

- Ergot (*Claviceps purpurea*): 6 ergopeptide alkaloids
  - Ergosine, Ergocristine, Ergocornine, Ergocryptine, Ergotamine, and Ergovaline
- *Fusarium spp.*
  - T-2 Toxin, Deoxynivalenol (DON), Diacetoxyscirpenol (DAS), Zearalenone, etc.



# Current Expertise

- Prairie Diagnostic Services: Liquid Chromatography-Mass Spectrometry (LC/MS) technology
- Interpretation (Dr. Blakley) and field investigation (WCVM)
- Analytical Ergot testing now available
- *Fusarium* panel available
- [pds.info@usask.ca](mailto:pds.info@usask.ca)



**PDS**

# Extent of the Problem

- Ergot – widespread SK, MB, AB
- Fusarium – widespread SK, MB, AB

# The Biology of Ergot Infection

- Certain non-grass species are resistant: canola, mustard, corn
- Cross-contamination is possible
- Grain, silage, and hay are all affected
- Pelleted rations containing screenings are a major source



# Types of Crops Affected

- Ergot – all grasses

Rye

Triticale

Brome grass

Barley, wheat

- Fusarium Corn T-2, HT-2, DON (vomitoxin)

Wheat

Barley

# Location of Contamination

- Primarily the head of the plant (grain)
- Fines may be contaminated
- Limited leaf and stem contamination
- Standing corn
- Swath grazing



# Pathological Effects of Ergot

- Vasoconstriction: gangrene of the feet, tail, and ears
- Nervous excitation: uncommon in Canada
- Agalactia: reduced or no milk production (prolactin)
- Reduced growth and feed consumption
- Abortion?
- Many effects are irreversible



# Pathological Effects of Fusarium

- Seasonal outbreaks: winter
- Feed-related herd problem
- No response to antibiotics
- Immune suppression
- Feed refusal
- Abortion
- Reversible



# Analysis

- Representative sampling
- Chemical analysis for mycotoxins
- Extent of mold a poor indicator of mycotoxin contamination

# *Why is ergot contamination increasing?*

- Increased moisture during flowering
- Changing temperatures
- Inappropriate crop rotation
- No till or low till cultivation
- Insufficient roadside weed/grass control
  
- Fusarium: warm fall weather

# Feed Guidelines in Dairy Cattle (TMR)

<b>Mycotoxin</b>	<b>Regulatory guideline (ppb or ug/kg)</b>	<b>Occurrence in SK</b>
<b>Ergot</b>	<b>100</b>	<b>High</b>
<b>DON (vomitoxin)</b>	<b>1000</b>	<b>High</b>
<b>3-Acetyl-DON</b>	<b>1000</b>	<b>Moderate</b>
<b>15-Acetyl-DON</b>	<b>1000</b>	<b>Moderate</b>
<b>Diacetoxyscirpenol</b>	<b>1000</b>	<b>Low</b>
<b>Nivalenol</b>	<b>1000</b>	<b>Low</b>
<b>T-2 Toxin</b>	<b>100</b>	<b>Moderate</b>
<b>HT-2 Toxin</b>	<b>25</b>	<b>Moderate</b>
<b>Zearalenone</b>	<b>100</b>	<b>Low</b>
<b>Aflatoxin</b>	<b>20</b>	<b>None</b>
<b>Ochratoxin</b>	<b>10</b>	<b>Low</b>
<b>Fumonisin</b>	<b>1000-3000</b>	<b>Low</b>

# Concerns

- Food safety      food and animal
- Export markets
- Non-representative sampling
- Residues            milk – low ergot  
  fusarium ?
- Withdrawal times
- Dairy – most sensitive livestock species
- Ethanol production
- Mycotoxin stability

# Contamination Prevention Strategies

Crop rotation

No wheat after rye

Fungicides

Deep ploughing

Mowing/spraying ditches



Delay harvest

Clean/sort grain

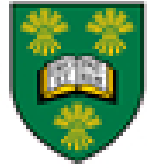
Selective harvesting

Binders

FDK/ergot bodies



# Acknowledgements



UNIVERSITY OF  
SASKATCHEWAN

Toxicology Centre



UNIVERSITY OF  
SASKATCHEWAN

Western College of  
Veterinary Medicine



UNIVERSITY OF  
SASKATCHEWAN

College of Agriculture  
and Bioresources

